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ABSTRACT

The experiences of public and private educational institutions with slant track videotape recording systems were surveyed. The users were requested to describe the type and brand of equipment they owned and to rate the machine's reliability and ascertain other performance factors. The survey also investigated the method of selection of equipment, the quality of maintenance, and the uses to which the recorder was put. The information gained in the survey is presented in table form, and some generalizations are drawn from the results. (JY)

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A SLANT TRACK VIDEOTAPE RECORDER SURVEY

by

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July 1, 1970

For the past two years, the Division of Communication Services, Northern Illinois University in DeKalb, Illinois, has been investigating users' experiences with the slant track videotape recorder. In the Fall of 1968, members of the Division made a telephone survey to some twenty typical users of small videotape recorders. The survey was undertaken to collect information on the reliability of recorders then available. The Division needed this information for selection of recorders for the 1968/69 school year. The calls answered the problem immediately facing the Division and revealed that the slant track videotape recorder field was characterized by confusion and frustration.

The confusion was an outgrowth of the bewildering array of recorders available and the frustration resulted primarily from the seemingly low reliability of some machines. From the phone calls, it was not clear whether the low reliability was due to the recorder design, construction, dealer service, misuse on the part of the operator, or unreal expectations on the part of the user.

To find answers to these questions, it was decided to initiate a mail questionnaire survey. The membership lists of various media associated professional organizations were checked to see which members could be identified with instructional television or slant track videotape recording system. A list of 753 people developed and each was sent a questionnaire. The results of this initial survey based on 499 usable returns were reported at the 1968 NAEB Convention. The enthusiastic reception given to this report encouraged the writers to repeat the survey in the Fall of 1969.

For this second annual survey, the mailing list was enlarged, the questionnaire refined, and the responses coded for computer processing. A total of 1,678 questionnaires were mailed and 746 usable returns received. The data included in this report is based on these returns.

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What Is A Slant Track Recorder?

Slant track is only one of the popular names for this type of video recorder. Other names sometimes used are helical-scan recorder and PVR (portable video recorder). While all of the names are more or less accurate, the term slant track seems to be the most descriptive and probably the most accepted. With all of these recorders the magnetic video track, as recorded on the tape, does slant across the tape (see B in Figure 1). This is in contrast to the video tracks of the quadraplex recorder which records in transverse tracks across the tape (see A in Figure 1).

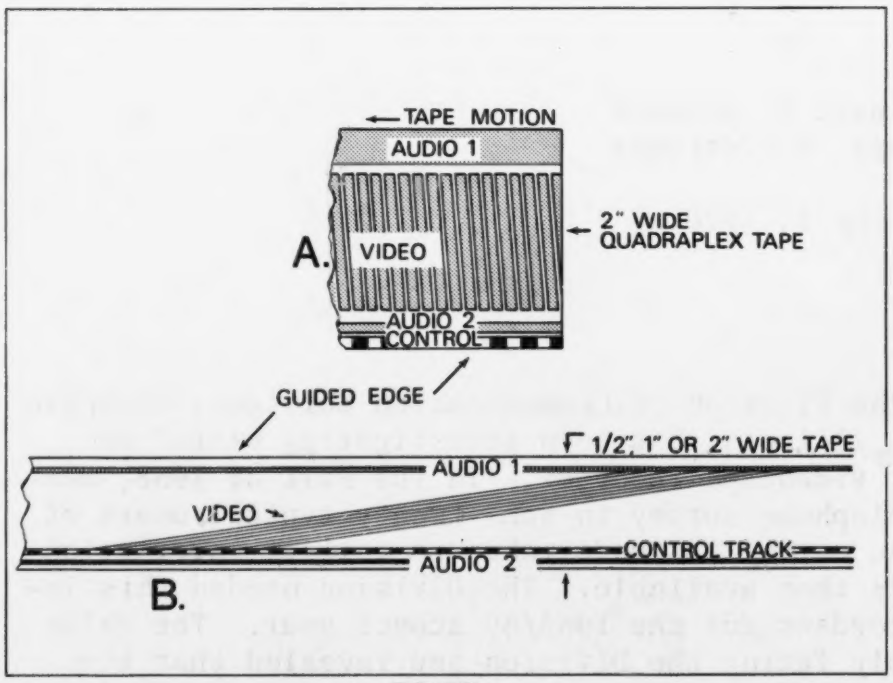


FIGURE 1.

The term helical-scan refers to the tape scanning system generated when the recording/playback head is spun inside a drum around which the tape is wrapped. There are basically two tape threading systems in use with these recorders (see Figure 2). One or the other of these is used by all helical-scan machines.

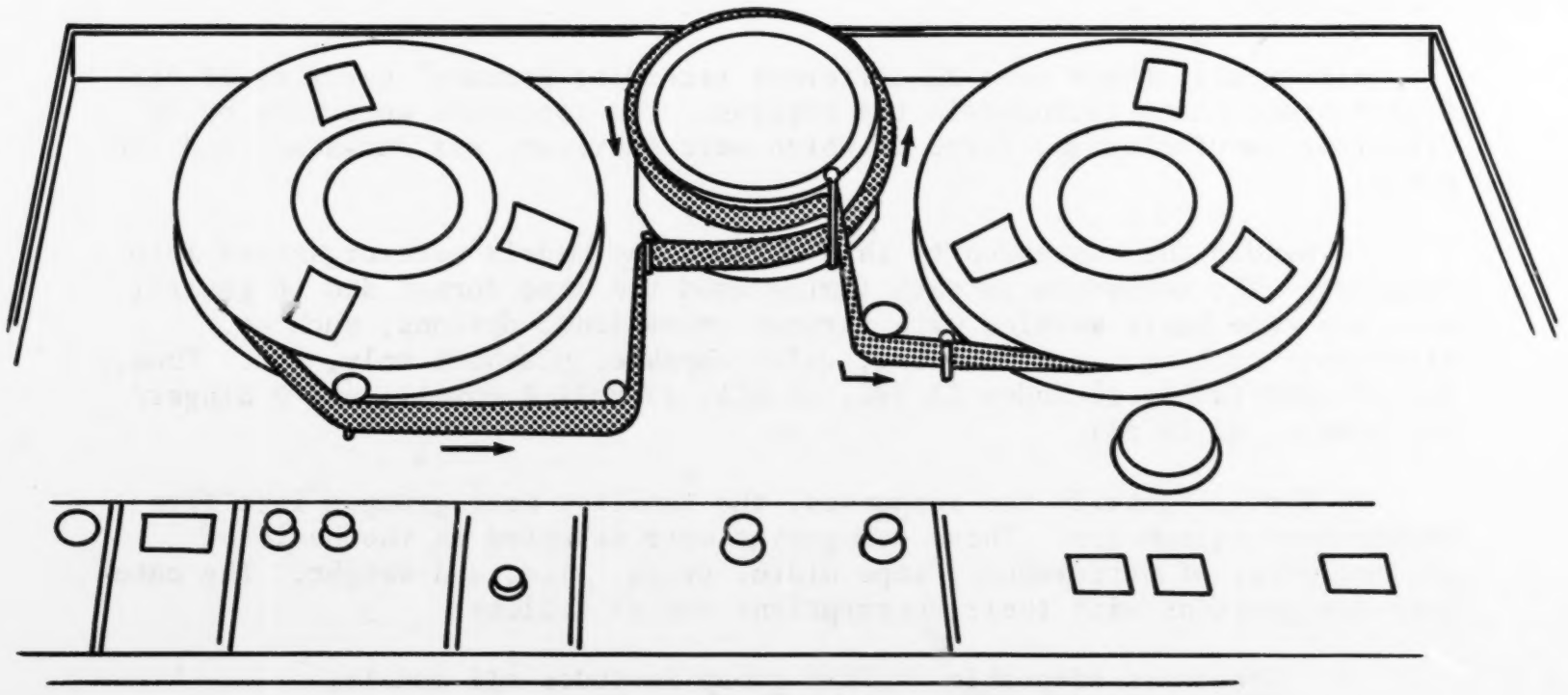
The term portable video recorder is misleading when applied to the entire range of machines. The smallest recorder weighs approximately 14 pounds and can be carried over the shoulder by a strap. The largest weighs 150 pounds and can only be classed as movable. The average weight for the 1/2" format tape recorder is 50 pounds, while the 1" format mid-range and low price recorders vary from 47 to 100 pounds.

Categories of Recorders

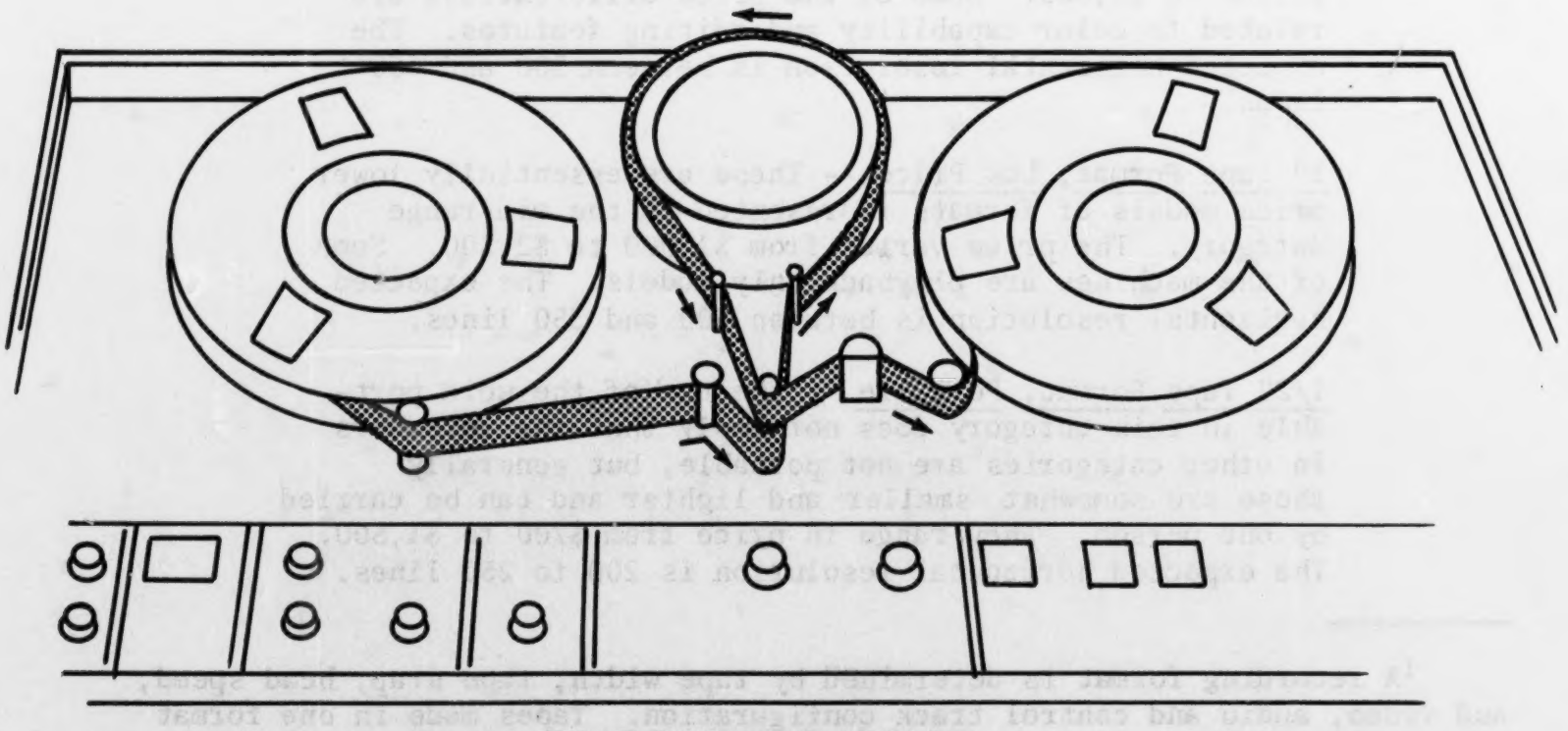
One of the most challenging aspects of this survey was the development of a classification system for the myriad of models now on the market as well as the many obsolete models still in use. The Ampex Corporation alone offers seven different models in their 1" tape format. When all of the various options are considered, this number more than doubles. The International Video Corporation (IVC) offers three basic recorders in their 800 series. When the options of these are included, the number of listed models jumps to 13. In addition, IVC has a 600 and 900 recorder series, each with several option configurations.

Another factor complicating the picture is the practice of marketing recorders under several brand names. The IVC-800 recorder is also available as

TAPE PATH ON HELICAL SCAN RECORDERS



ALPHA TAPE WRAP



OMEGA TAPE WRAP

FIGURE 2.

the Bell & Howell 2910, RCA 59118, and the Singer/GPL VR-400-1. This survey alone includes returns covering 79 different models, about 1/3 of which are now obsolete.

All in all, there were 15 different recording formats[1] carrying 15 different brand names included in the returns. The recorders were made by 10 different manufacturers, three of which were American, six Japanese, and one Dutch.

To handle the responses to this survey, the models were organized into families. The recorders in each family used the same format and in general were the same basic machine with various operational options; such as, electronic editing, rack mounting, color capable, playback only, etc. Thus, the IVC-800 family includes 13 IVC, 10 RCA, 10 Bell & Howell, and 9 Singer/GPL models, 42 in all.

To further clarify the responses, the families were grouped into five performance categories. These categories were selected on the basis of *claimed* level of performance, tape width, price, size, and weight. The category designations with their descriptions are as follows:

> Broadcast Adaptable -- This group includes all models, irrespective of format, which can meet broadcast standards as to stability, reliability, and quality of performance. They range in price from $9,000 to $16,500. The expected horizontal resolution is between 300 and 350 lines.
>
> 1" Tape Format, Mid-Range -- This category includes those machines using 1" tape and varying in price from $2,500 to $6,000. Some of the price differentials are related to color capability and editing features. The expected horizontal resolution is between 300 and 350 lines.
>
> 1" Tape Format, Low Price -- These are essentially lower price models of formats represented in the mid-range category. The price varies from $1,000 to $2,500. Some of the machines are playback only models. The expected horizontal resolution is between 300 and 350 lines.
>
> 1/2" Tape Format, Portable -- The use of the word portable in this category does not imply that the recorders in other categories are not portable, but generally these are somewhat smaller and lighter and can be carried by one person. They range in price from $700 to $1,500. The expected horizontal resolution is 200 to 250 lines.

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[1]A recording format is determined by tape width, tape wrap, head speed, and video, audio and control track configuration. Tapes made in one format cannot be played on machines using another format.

1/2" Tape Format, Battery Powered -- These are truly portable recorders since they are battery powered and can be carried by means of a shoulder strap. The price range is $1,000 to $1,500. This price includes a camera, but the recorder does not have playback or motor-driven rewind facilities. The overall system response will produce pictures with 200 to 250 line horizontal resolution. Tapes made with these recorders must be played-back on a compatible recorder in the 1/2" tape format, portable category.

Who Were The Respondents And What Did They Represent?

The survey questionnaire included questions about the respondent and the school or organization being reported (Part A), and collected data on specific models of recorders in use by the respondents (Part B). Each mailing included six blank copies of Part B and the respondents were asked to complete a B form for each different model in use at their location.

Responses from 746 individuals were received. These contained 1,328 complete and usable Part B's covering 3,104 individual recorders. The largest single response came from universities or colleges. Of the 301 university responses received, nearly two thirds were from public supported insititutions.

The next largest grouping was the elementary and secondary schools. While more than 30% of the university answers came from private schools, only 7% of the 260 elementary and secondary school responses came from privately financed schools.

The responses from the public funded universities and colleges and the private institutions was compared to see if there were any observable differences related to the funding factor. It appeared that the source of funds made very little differences. The public supported institutions had, on the average, more recorders than the private schools; however, they were being used in approximately the same ways with the same results.

The respondents were also asked to indicate how they would classify their jobs. Some 45% of those answering identified their job as *Administrator*. While there was no attempt to further analyze the *Administrator's* category as to what they administered, it is presumed that many of their reports included information collected from various sources and compiled into a composite picture.

The remaining 55% of the respondents were distributed primarily among three additional job classifications. The second largest classification was *Media Specialist* with 28%, the next was *Technician* with 14%, and the fourth was *Teacher* with 10%.

As a test of the validity of the sample, the responses to three key questions were analyzed to see if the *Technician* and *Media Specialist*, who would be expected to be better qualified to answer, did in fact reply differently from each other or from the remaining respondents, who were classified as *All*

Others. The questions chosen related to the skill needed to operate the recorders, the reliability of the recorders, and the overall performance of the recorders. Somewhat to our surprise, the ratings from each "job classification" were practically identical. For example, ratings from all three job classification groups for the *skill needed to operate the recorders* was either 2.2 or 2.3 on a four point scale on which 1.0 represented the lowest level of skill and 4.0 represented the highest. The ratings for the *reliability of the recorders* was either 3.0 or 3.1 on a similar four point scale. Likewise, the ratings for *overall performance* was either 3.0 or 3.2. Since there were no significant differences, further investigation was not made of the data.

When this survey was planned and the questionnaire designed, it was assumed that there would be differences in responses related to the degree of technical sophistication on the part of the reporting organization. To check this, the replying organizations were asked if they were using one or more quadraplex recorders. Since these recorders operate on broadcast standards, it is necessary to operate the associated television systems at a high level of sophistication with rigid parameters. Systems without quadraplex recorders are not necessarily operated on lower standards, but those with the quadraplex recorder are known to use high standards. An examination of the data compiled from quadraplex users and non-users did not indicate any observable differences in their responses.

What Were The Major Uses For The Recorders?

The respondents were asked to list the major uses for each model recorder being reported. Instant playback, closed circuit distribution, off-air-recording, and recording for future use were high in most recorder categories. There were some changes from the previous year's results observed. In the broadcast adaptable and in both 1" tape format categories, the playback of exchanged tapes ranked in the top five major uses, a use that had been ranked very low in the previous survey. This could mean that more tapes are being exchanged between users and one of the real potentials of instructional television is being realized.

Another change noted was the reported use of 1/2" format machines for the collecting and storing of research data and results. While this is a form of recording for future use, it is a use sufficiently specialized to be considered as a class by itself. A ranking of the primary uses for each of the recorder categories is shown in Table I.

Who Normally Operates These Recorders?

In the 1968 survey, the data showed a trend towards successful operation by the unskilled operator. This trend appeared even stronger in the second survey. Technicians were most often used to operate the more complicated and sophisticated machines. In all other categories, teachers and students operated the recorders most often. In the broadcast adaptable category, as many as 80% were operated

PRIMARY USES

USE RANK	BROADCAST ADAPTABLE	1" MID-RANGE	1" LOW PRICE	1/2" PORTABLE	1/2" BATTERY POWERED
1	Recording For Future Use	Instant Play-back	Instant Play-back	Instant Play back	Instant Play-back
2	Closed-Circuit Distribution	Recording For Future Use	Closed-Circuit Distribution	Recording For Future Use	Record Data, Tests, Etc.
3	Instant Play-back	Closed-Circuit Distribution	Recording For Future Use	Off-Air Recording	Recording For Future Use
4	Off-Air Recording	Off-Air Recording	Playback Of Exchanged Tapes	Record Data, Tests, Etc.	----
5	Playback Of Exchanged Tapes	Playback Of Exchanged Tapes	Off-Air Recording	Closed-Circuit Distribution	----

TABLE I

by technicians. For the 1/2" portable recorder, use by technicians dropped to 25%. The most significant figures were those for use by teachers and students. Almost 75% of the 1/2" portable machines are operated at some time by teachers and 54% of them are operated by students. These figures indicate that these machines, particularly the less sophisticated ones, are in the hands of the ultimate users.

Closely allied to who operates the various recorders is the degree of skill judged necessary for successful use. A four point scale was used to rate the skill required. A rating of 1.0 was assigned to the lowest skill and 4.0 reflected the highest skill required. It was significant that all but one family of recorder was rated as requiring a skill of 2.5 or less. Only models in the Ampex 7800 family were judged to require a degree of skill above the mid-point on the scale. These recorders require a skill of 3.2 while the other two recorder families in the broadcast adaptable category were assigned an average rating of 2.5. The easiest machines to operate were those in both of the 1/2" tape format categories. The skill required to operate these machines was rated at 1.9.

Who Services These Recorders?

In the past, one of the most loudly proclaimed problems in slant track recorder use was the service provided after purchase. The quality, availability, and need for service was consistently rated as a high priority item on both the 1968 and 1969 surveys. The assumption was made prior to this survey that service following the warranty period would be furnished primarily by the manufacturer or franchise dealer; therefore, any difficulties with this service would be a problem for these agencies. Table II shows that this assumption was not entirely supported by the data. Only the simplest, least sophisticated classes of recorders were service often by the franchise dealer than by the user's own personnel. It would appear then that the service problem is primarily one which is internal to the user's organization. The manufacturers do not have a large involvement in direct service; however, the design of the machine and the workmanship in manufacture does affect the service and this <u>is</u> their problem.

WHO NORMALLY SERVICES THIS RECORDER?

	BROADCAST ADAPTABLE	1" MID-RANGE	1" LOW PRICE	1/2" PORTABLE	1/2" BATTERY POWERED
Franchise Dealer	18%	33%	36%	46%	47%
Own Personnel	74%	53%	54%	38%	38%
Manufacturer	2%	6%	3%	7%	5%
Independent Service Organization	3%	5%	5%	7%	7%
Other	3%	3%	2%	2%	3%

TABLE II

One other service related item is the availability of replacement parts. On the satisfaction/dissatisfaction scale reported in Table IV, the respondents noted that it was relatively difficult to obtain repair parts.

What Factors Were Used In The Selection Of Slant Track Recorders?

The survey seemed to indicate that some recorders were being used to do jobs for which they were not designed. This is particularly noticeable in the returns from respondents claiming complete dissatisfaction.

To find out what the users considered important when selecting a recorder, they were asked to rate their selection factors for each model in use. Table III lists the first seven factors for each category of recorder. The numbers shown relate to the four point scale used throughout this study and are used here to indicate relative strengths and ranking position among the selection factors. It is necessary to note N for each category before making any inter-category comparisons.

As can be seen in Table III, neither *slow motion* nor *color capable* rated high as factors of selection. It isn't surprising that *ease of operation* is the strongest overall selection factor, but it is surprising to find how strong the practice of applying *state prescribed standards* is to these purchases. State standards, particularly of tape format, are an economic necessity if tape libraries or tape exchanges are being used. This is unfortunate for the users as he may be forced to purchase machines of inferior quality or reliability. It is also difficult for them to take advantage of "state-of-the-art" changes. The deplorable practice of proliferating tape models and formats cannot help but work to the users' and small manufacturers' disadvantage. As will be seen later, corporate "bigness" or a high percentage of total sales does not necessarily mean user satisfaction or equipment reliability.

What Were The Important Performance Factors?

Respondents were asked to rate the performance of models based on their use experience. Tables IV and V report the average ratings for the most important factors. The first of these tables lists the ratings for the five categories of recorders. Table V shows the average rating of all models manufactured by each of four companies. These four were the ones with the largest number of returns.

Generally speaking, the less expensive machines received higher performance ratings (this trend was also apparent in the 1968 survey). The unshaded areas on the tables features ratings that varied at least 0.3 of a point above average of each performance factor. The ratings shaded with a dot pattern varied at least 0.3 of a point below the average. The ratings shaded with a cross line pattern deviated less than 0.3 of a point. Some of the ratings with lower variance were also important, but those deviating 3 tenths of a point or more from the average were judged to be more significant. From the ratings in both tables, it is obvious that there are some definite differences between models and between manufactuers.

FACTORS USED IN SELECTING RECORDERS

RANK	ALL RECORDERS	BROADCAST ADAPTABLE	1" MID-RANGE	1" LOW PRICE	1/2" PORTABLE	1/2" BATTERY POWERED
	N=908 Avg	N=159 Avg	N=294 Avg	N=136 Avg	N=253 Avg	N=66 Avg
1	Ease of operation 3.2	Compatability with other owned equipment 3.5	Availability of service 3.0	Compatability with other owned equipment 3.6	Ease of operation 3.6	Battery powered 4.0
2	Price 3.1	Broadcast standards 3.4	Ease of operation 2.9	Price 3.4	Price 3.4	Size and weight 3.8
3	Compatability with other owned equipment 3.1	Electronic editing 3.3	Price 2.9	Availability of service 3.2	Size and weight 3.3	Ease of operation 3.6
4	Availability of service 3.1	Ease of operation 3.1	State prescribed standards 2.8	State prescribed standards 3.1	Ease of maintenance 3.2	Compatability with other owned equipment 3.4
5	Ease of maintenance 2.8	State prescribed standards 3.0	Color capable 2.7	Ease of operation 2.9	Availability of service 3.2	Price 3.2
6	Size and weight 2.8	Availability of service 2.9	Compatability with other owned equipment 2.7	Size and weight 2.9	Compatability with other owned equipment 3.1	Availability of service 3.2
7	State prescribed standards 2.8	Previous experience 2.7	Ease of maintenance 2.6	Ease of maintenance 2.7	Previous experience 2.9	State prescribed standards 3.1

4.0 = Strong Factor
1.0 = Weak Factor

TABLE III

RATING OF PERFORMANCE FACTORS

	TOTAL: ALL MACHINES	BROADCAST ADAPTABLE	1" MID-RANGE	1" LOW PRICE	1/2" PORTABLE	1/2" BATTERY POWERED
	N=1184 Avg	N=214 Avg	N=426 Avg	N=167 Avg	N=310 Avg	N=67 Avg
Reliability	3.1	3.0	2.8	2.8	3.5	3.4
Cost of Operations	3.3	3.2	3.1	2.8	3.8	3.6
Tape Interchange Same Model	3.4	3.4	3.2	3.5	3.6	3.8
Tape Interchange Between Models	3.2	2.9	3.2	3.4	3.0	3.5
Ease of Operation	3.5	3.4	3.3	3.5	3.8	3.8
Availability of Service	3.0	2.8	2.8	3.0	3.1	3.1
Ease of Maintenance	2.8	2.7	2.4	2.9	3.2	3.4
Picture Quality	3.2	3.2	3.3	3.3	3.2	3.4
Sound Quality	3.4	3.4	3.5	3.3	3.3	3.1
Size and Weight	3.0	2.7	2.6	3.1	3.6	3.8
Availability of Parts	2.8	2.6	2.7	2.9	2.9	3.0

4.0 Points = High Degree of Satisfaction
1.0 Points = Low Degree of Satisfaction

TABLE IV

( ) Above The Average
( ) Below The Average

USER RATINGS OF PERFORMANCE FACTORS

(By Manufacturer)

PERFORMANCE FACTORS	AVERAGE N=1175 Avg	AMPEX N=706 Avg	SONY N=387 Avg	IVC N=36 Avg	PANASONIC N=46 Avg
Reliability	3.0	2.7	3.5	3.6	3.3
Tape Interchange Same Model	3.5	3.4	3.5	3.7	3.2
Tape Interchange Between Models	3.2	3.2	3.0	3.6	3.0
Ease of Operation	3.4	3.2	3.7	3.9	3.8
Availability of Service	2.9	2.8	3.0	3.3	3.0
Ease of Maintenance	2.8	2.6	3.2	3.0	2.7
Picture Quality	3.2	3.3	3.2	3.4	3.2
Sound Quality	3.4	3.4	3.4	3.5	3.2
Availability of Parts	2.8	2.7	2.9	3.1	2.6

4.0 = High Degree of Satisfaction
1.0 = Low Degree of Satisfaction

( ) Above The Average
( ) Below The Average

TABLE V

Many of the ratings in the total columns are above 3.0 on the four point scale. This seems to say that while there are differences, in general, factors such as *ease of operation, picture and sound quality,* and *tape interchangeability* are more satisfactory. The difficulties, as indicated by relatively lower ratings, are with the factors related to reliability and service. The respondents were indicating that the recording quality was satisfactory for the specific use situation. When the machines worked, they worked well.

In addition to rating individual performance factors, respondents also gave each model an overall performance rating. This overall rating, both by category (Table VII) and by manufacturer (Table VIII), reinforces the high degree of satisfaction with slant track videotape recorders reflected in the ratings for individual factors. Again, it is apparent that less sophisticated machines recieve higher ratings of performance by users.

As a further check on the nature of these performance factors, the replies from 89 dissatisfied respondents were examined. They had marked the overall performance rating of a particular model as completely unsatisfactory.

These replies (Table VI) represented 109 machines distributed among three categories. There were no dissatisfied reports in the 1/2" battery powered category and only 7 responses in the 1/2" portable category; therefore, these models were eliminated from the table. The shaded and unshaded areas again feature ratings differing at least 0.3 of a point.

The experience factors on Table VI are arranged in order of increasing user satisfaction. The four highest dissatisfaction factors were for the highly interrelated problems of reliability and service.

Is Overall Performance Related To Amount Of Use And Movement?

The uses to which slant track videotape recorders are put suggest that frequent movement of these machines might adversely affect performance. A comparison of *amount of movement, rate of use* and *performance* was made. The smaller, lighter weight machines, as expected, are moved most often; however, the relatively high rate of movement for the broadcast adaptable machines was surprising. These relatively heavy machines were listed as being moved on an average of 3 times per month by 50% of the respondents. The 1/2" battery powered recorder was moved on an average 4 times per week by 100% of the users. The 1/2" portable category machines was moved 3 times per week by 95% of the respondents.

While the rate of movement increased as the size and weight of the recorders went down, the average amount of use decreased with the increased movement. This ranged from an average of 12-1/2 hours per week for the broadcast adaptable models to 7 nours of use per week for the 1/2" battery powered models.

It was expected that there would be an inverse correlation between the amount of movement and performance rating, the higher the level of movement (more movement) the lower the level of performance. This was not the case. The models being moved most gave the most satisfactory performance. The highest performance rating on our 4 point scale was 3.8 for the 1/2" portable category and among the lowest was 3.1 for the broadcast adaptable category..

EXPERIENCE FACTORS OF MOST DISSATISFIED RESPONDENTS

EXPERIENCE FACTOR	ALL RECORDERS N=109	BROADCAST ADAPTABLE N=25	1" MID-RANGE N=64	1" LOW PRICE N=20
Relaibility	1.1	1.2	1.1	1.1
Ease of Maintenance	1.5	1.4	1.5	1.9
Availability of Parts	1.9	1.8	1.9	2.4
Availability of Service	2.0	1.8	2.1	2.8
Tape Inter-changeability Between Models	2.1	1.9	2.0	2.8
Cost of Operation	2.1	2.0	2.1	1.8
Tape Duplication	2.2	2.3	2.1	2.4
Size & Weight	2.2	1.9	2.0	2.8
Tape Inter-changeability Same Model	2.5	2.4	2.4	2.9
Picture Quality	2.6	2.5	2.6	2.6
Ease of Operation	2.6	2.6	2.5	3.0
Sound Quality	2.9	2.9	3.1	2.8
Recording Time Capacity	3.5	3.7	3.5	3.6

4.0 = High Degree of Satisfaction
1.0 = Low Degree of Satisfaction

TABLE VI

( ) Above The Average
( ) Below The Average

OVERALL PERFORMANCE RATINGS BY USERS

(By Categories)

	REPLIES	RATING
Broadcast Adaptable	234	3.1
1" Mid-Range	451	3.2
1" Low Cost	179	3.0
1/2" Portable	639	3.8
1/2" Battery Powered	71	3.7

4.0 = Most Satisfactory
1.0 = Unsatisfactory

TABLE VII

OVERALL PERFORMANCE RATINGS BY USERS

(By Manufacturers)

	REPLIES	RATING
Ampex	745	2.9
Sony	419	3.6
Panasonic	49	3.4
IVC	40	3.6
Other	64	3.3

4.0 = Most Satisfactory
1.0 = Unsatisfactory

TABLE VIII

If You Were Starting Over Today, Would The Same Model Recorder Be Selected?

The indications are that many of the users of videotape recorders would select other models if they were starting over today. This picture is somewhat colored by the fact that many of the models currently in use are no longer available; therefore, if a respondent is starting over, he may have to change models but not necessarily brand or format. This is illustrated in the broadcast adaptable category. Many of the respondents are using Ampex 660 or 660-B machines; neither of these is available today since the current production model is the 660-C. Anyone desiring to stay with the Ampex 660 line or to use tapes previously recorded with this format would have to change to the 660-C model.

The effect of obsolescence is reflected in Table IX. Nearly 1/3 of those using broadcast adaptable machines and changing would stay with the same brand but would select a different model. The high degree of user satisfaction with the lower priced machines is again emphasized here by the small percentage of those changing in both of the 1/2" format categories.

In this table, the percentage figures shown for those definitely changing have been further broken down to show the type of selection to be made. For instance, in the broadcast adaptable category 14% of the 238 respondents would be changing and selecting a different model of the same manufacturer, 16% would select a different brand and model, and 16% who would change did not indicate a choice. In all, 46% of the respondents would be making some change.

USERS CHOICE IF GIVEN A SECOND CHANCE

CATEGORY	PERCENTAGE CHANGING	NEW SELECTIONS BY USERS DEFINITELY CHANGING		
		SAME BRAND DIFFERENT MODEL	DIFFERENT BRAND AND MODEL	NO CHOICE INDICATED
BROADCAST 238 Respondents 395 Recorders	46%	14%	16%	16%
1" MID-RANGE 492 Respondents 1023 Recorders	41%	10%	20%	11%
1" LOW PRICE 178 Respondents 547 Recorders	30%	3%	16%	11%
1/2" PORTABLE 337 Respondents 914 Recorders	15%	2%	7%	6%
1/2" BATTERY POWERED 71 Respondents 126 Recorders	7%	-	3%	4%

TABLE IX

In the 1968 survey, there appeared to be an acceptance of the IVC recorders as a desirable replacement. At that time, IVC was relatively new to the market and the number of respondents using IVC was small. The 1969 survey includes replies from considerably more IVC/B&H users, but the number compared to Ampex and Sony is still small. Responses providing data on 90 machines was received from 42 IVC/B&H users. Of these, only two respondents indicated a desire to change to a recorder from a different manufacturer.

On the other hand, the trend towards acceptance of the IVC which was noticed in 1968, is continued in this survey. The respondents who indicated dissatisfaction with their recorders were asked to name another brand and model which they would select today. Replies were received from 192 respondents and Table X reports the number and percentage of those selecting a manufacturer different from the one producing their present model. Certainly a part of this IVC support is due to reported experience from those using IVC recorders and another part is based on individual inspection.

However, it shouldn't be overlooked that the IVC is a relatively new entry in the field and has yet to develop a track record. Ampex recorders, on the other hand, have been available for several years and they have had more time to accumulate complaints. (It is interesting that Sony recorders have been available nearly as long as Ampex and their acceptance, as shown in this survey, has been generally better than Ampex but not as good as IVC.)

CHOICES OF RESPONDENTS DEFINITELY SELECTING

ANOTHER MANUFACTURER

MANUFACTURER SELECTED	NUMBER SELECTING	PERCENT SELECTING
IVC	94	49%
SONY	56	29%
AMPEX	27	14%
OTHER	15	8%
	192	100%

TABLE X

Summary

This section is usually titled "Conclusions," but on reflection such an approach seemed premature. The slant track videotape recorder is so young and viable all we can do is describe it at this stage of development. Unfortunately, the field is not becoming less complicated as the number of models and recording formats continue to grow. Since beginning this survey, two companies have introduced videotape recorders using tape in cassettes (both on different formats.) Several companies have developed new models, and at least one new tape format has been added increasing the confusion.

Other developments like EVR (electronic video recording), tape duplication, long playing recorders, and video disc recording are also contributing to the "muddle." Nonetheless, it is possible to make some observations and suggestions.

The major difficulty with some of these recorders seems to be in their reliability. Many of the respondents felt that the related areas of service, maintenance, and availability of repair parts were also problems. It is reasonable to expect low reliability if maintenance is poor; on the other hand, a large share of the maintenance and service was being performed by the users' own personnel. The implication to the manufacturer and dealer is to improve their procedures for supplying repair parts and to promote and expand their training programs for technicians.

Another factor which may contribute to user dissatisfaction is the practice of using the wrong recorder for a specific purpose. For instance, the 1/2" portable category of machine works well for instant playback of student performance, but it is not designed to feed a closed circuit distribution system. In selecting a recorder, it is important to analyze the requirements first -- one should not expect a recorder to do all jobs equally well.

The matter of selecting slant track videotape recorders is complicated and unfortunately it may get worse. If the trend towards confusion is to be reversed, some standardization must be achieved. Ampex has been marketing recorders using 1" and 2" tape and has indicated they are considering entering the 1/2" tape field. The Japanese manufacturers have announced a standard for 1/2" tape recorders -- one not currently being used by any manufacturer. When a new standard line is developed, for a while manufacturers will very likely supply two types of machines; one with their previously established format and one with the agreed upon standard format. It would be a great step forward if the new Ampex 1/2" tape format were compatible with the Japanese standard.

One trend that is most encouraging is the large number of teachers and students who are operating these recorders. Much of the value of the videotape recorder is in the ability for instant playback. Freeing the recorders from schedules, technicians, and specialized operators makes their use an everyday or everyhour teaching tool.

Educators and manufacturers should be optimistic; while problems do exist, they are not unsolvable. We interpret the data to reflect a general satisfaction and acceptance on the part of the users. An additional optimistic note is the interest and support of those responding to our plea for information and their general interest in developing the videotape recorder into an indispensable teaching tool.